**SFP-16GB-DW46-40-BR-AO**

Brocade® (Formerly) Compatible TAA 16GBase-DWDM FC SFP+ Transceiver C-Band 100GHz (SMF, 1540.56nm, 40km, LC, DOM)

**Features:**

- SFF-8432 and SFF-8472 Compliance
- Cooled EML transmitter and PIN receiver
- Duplex LC Connector
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Single-mode Fiber
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free



**Applications:**

- 8x/10x Fibre Channel
- 16x Gigabit Ethernet over DWDM
- Access, Metro and Enterprise

**Product Description**

This Brocade® (Formerly) compatible SFP+ transceiver provides 16GBase-DWDM Fibre Channel throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1540.56nm via an LC connector. It can operate at temperatures between 0 and 70C. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Brocade® (Formerly). It has been programmed, uniquely serialized, and tested for data-traffic and application to ensure that it will initialize and perform identically. All of our transceivers comply with Multi-Source Agreement (MSA) standards to provide seamless network integration. Additional product features include Digital Optical Monitoring (DOM) support which allows access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

AddOn's transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S.-made or designated country end products."

TAA COMPLIANT

**Regulatory Compliance**

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4.
- ESD to the LC Receptacle: compatible with IEC 61000-4-3.
- EMI/EMC: compatible with FCC Part 15 Subpart B Rules, EN55022:2010.
- Laser Eye Safety: compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1, 2.
- RoHS: compliant with EU RoHS 2.0 directive 2015/863/EU.

**Wavelength Guide (100GHz ITU-T Channel)**

| Channel # | Frequency (THz) | Center Wavelength (nm) |
|---|---|---|
| **17** | 191.7 | 1563.86 |
| **18** | 191.8 | 1563.05 |
| **19** | 191.9 | 1562.23 |
| **20** | 192.0 | 1561.42 |
| **21** | 192.1 | 1560.61 |
| **22** | 192.2 | 1559.79 |
| **23** | 192.3 | 1558.98 |
| **24** | 192.4 | 1558.17 |
| **25** | 192.5 | 1557.36 |
| **26** | 192.6 | 1556.55 |
| **27** | 192.7 | 1555.75 |
| **28** | 192.8 | 1554.94 |
| **29** | 192.9 | 1554.13 |
| **30** | 193.0 | 1553.33 |
| **31** | 193.1 | 1552.52 |
| **32** | 193.2 | 1551.72 |
| **33** | 193.3 | 1550.92 |
| **34** | 193.4 | 1550.12 |
| **35** | 193.5 | 1549.32 |
| **36** | 193.6 | 1548.51 |
| **37** | 193.7 | 1547.72 |
| **38** | 193.8 | 1546.92 |
| **39** | 193.9 | 1546.12 |
| **40** | 194.0 | 1545.32 |
| **41** | 194.1 | 1544.53 |
| **42** | 194.2 | 1543.73 |
| **43** | 194.3 | 1542.94 |
| **44** | 194.4 | 1542.14 |

| | | |
|---|---|---|
| **45** | 194.5 | 1541.35 |
| **46** | 194.6 | 1540.56 |
| **47** | 194.7 | 1539.77 |
| **48** | 194.8 | 1538.98 |
| **49** | 194.9 | 1538.19 |
| **50** | 195.0 | 1537.40 |
| **51** | 195.1 | 1536.61 |
| **52** | 195.2 | 1535.82 |
| **53** | 195.3 | 1535.04 |
| **54** | 195.4 | 1534.25 |
| **55** | 195.5 | 1533.47 |
| **56** | 195.6 | 1532.68 |
| **57** | 195.7 | 1531.90 |
| **58** | 195.8 | 1531.12 |
| **59** | 195.9 | 1530.33 |
| **60** | 196.0 | 1529.55 |
| **61** | 196.1 | 1528.77 |

### Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Maximum Supply Voltage** | Vcc | -0.5 | | 4.5 | V | |
| **Storage Temperature** | Tstg | -40 | | 85 | ˚C | |
| **Operating Case Temperature** | Tc | 0 | | 70 | ˚C | |
| **Operating Humidity** | RH | 5 | | 95 | % | |
| **Data Rate** | BR | 4.25 | 14.025 | | Gbps | |

**Electrical Characteristics**

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|---|
| **Power Supply Voltage** | | Vcc | 3.135 | 3.30 | 3.465 | V | |
| **Power Supply Current** | | Icc | | | 550 | mA | |
| **Transmitter** | | | | | | | |
| **Differential Data Input Swing** | | VIN | 180 | | 850 | mV | 1 |
| **Input Differential Impedance** | | ZIN | 90 | 100 | 110 | Ω | |
| **Tx_Disable** | **Disable** | VIH | 2.0 | | Vcc | V | |
| | **Enable** | VIL | 0 | | 0.8 | V | |
| **Tx_Fault** | **Fault** | VOH | 2.0 | | Vcc | V | |
| | **Normal** | VOL | 0 | | 0.8 | V | |
| **Receiver** | | | | | | | |
| **Differential Data Output Swing** | | VOUT | 300 | | 900 | mV | 2 |
| **LOS** | | High | 2.0 | | Vcc | V | |
| | | Low | | | 0.8 | V | |

**Notes:**

1. PECL input. Internally AC-coupled and terminated.
2. Internally AC-coupled.

**Optical Characteristics**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | |
| **Center Wavelength** | λC | 1528.77 | | 1563.86 | nm | |
| **Spectral Width (-20dB)** | Δλ | | | 1 | nm | |
| **Side-Mode Suppression Ratio** | SMSR | 30 | | | dB | |
| **Average Output Power** | POUT | -1 | | 3 | dBm | 1 |
| **Extinction Ratio** | ER | 8.2 | | | dB | |
| **Receiver** | | | | | | |
| **Center Wavelength** | λC | 1260 | | 1620 | nm | |
| **Receiver Sensitivity** | S | | | -14 | dBm | 2 |
| **Receiver Overload** | POL | 0.5 | | | dBm | 2 |
| **LOS De-Assert** | LOSD | | | -15 | dBm | |
| **LOS Assert** | LOSA | -28 | | | dBm | |
| **LOS Hysteresis** | LOSH | 0.5 | | | dB | |

**Notes:**

1. The optical power is launched into the SMF.
2. Measured with a PRBS $2^{31}$-1 test pattern @14025Mbps, BER ≤$1\times10^{-12}$.

**Timing and Electrical Specifications**

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| **Tx _Negate Time** | T_on | | | 2 | ms |
| **Tx_Disable Assert Time** | T_off | | | 100 | µs |
| **Time To Initialize Including Reset of Tx_Fault** | T_init | | | 300 | ms |
| **Tx_Fault Assert Time** | T_fault | | | 100 | µs |
| **Tx_Disable To Reset** | T_reset | 10 | | | µs |
| **LOS Assert Time** | T_loss_on | | | 100 | µs |
| **LOS De-Assert Time** | T_loss_off | | | 100 | µs |
| **Serial ID Clock Rate** | T_serial_clock | | 100 | 400 | KHz |
| **MOD_DEF (0:2) - High** | VOH | 2 | | Vcc | V |
| **MOD_DEF (0:2) - Low** | VOL | | | 0.8 | V |

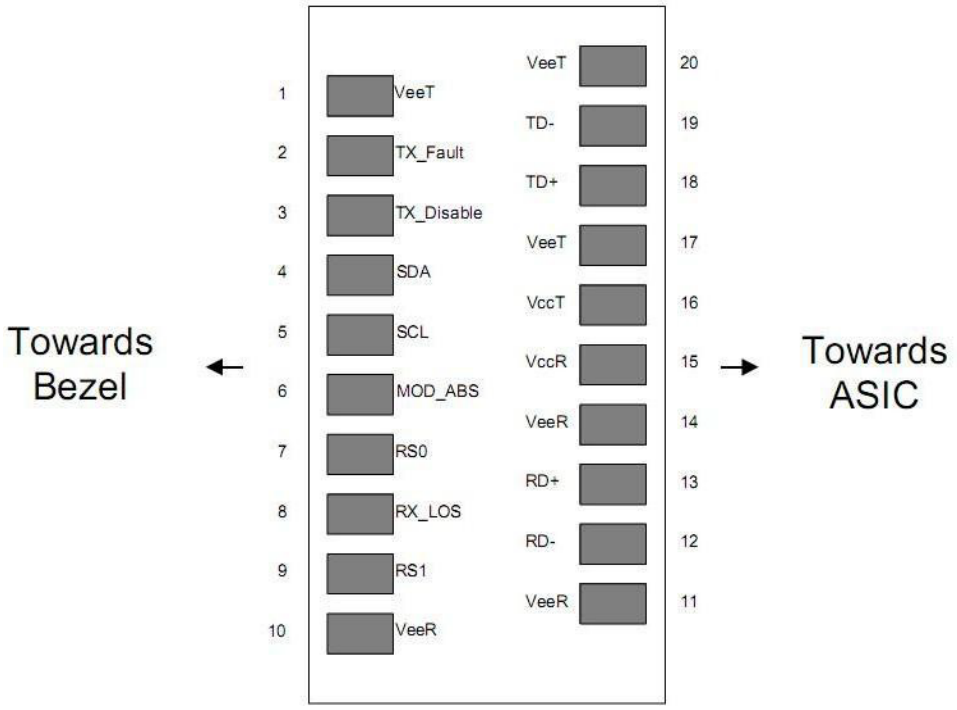
**Pin Descriptions**

| Pin | Symbol | Name/Descriptions | Ref. |
|---|---|---|---|
| **1** | VeeT | Transmitter Ground (Common with Receiver Ground). | 1 |
| **2** | Tx_Fault | Transmitter Fault. LVTTL-O. | 2 |
| **3** | Tx_Disable | Transmitter Disable. Laser output disabled on “high” or “open.” LVTT-I. | 3 |
| **4** | SDA | 2-Wire Serial Interface Data (Same as MOD-DEF2 in INF-8074i). LVTTL-I/O. | |
| **5** | SCL | 2-Wire Serial Interface Clock (Same as MOD-DEF2 in INF-8074i). LVTTL-I. | |
| **6** | MOD_ABS | Module Absent. Connect to VeeT or VeeR in the module. | 4 |
| **7** | RS0 | Rate Select 0. Not Used. | 5 |
| **8** | LOS | Loss of Signal Indication. “Logic 0” indicates normal operation. LVTTL-O. | 2 |
| **9** | RS1 | Rate Select 1. Not Used. | 5 |
| **10** | VeeR | Receiver Ground (Common with Transmitter Ground). | 1 |
| **11** | VeeR | Receiver Ground (Common with Transmitter Ground). | 1 |
| **12** | RD- | Receiver Inverted Data Out. AC Coupled. CML-O. | |
| **13** | RD+ | Receiver Non-Inverted Data Out. AC Coupled. CML-O. | |
| **14** | VeeR | Receiver Ground (Common with Transmitter Ground). | 1 |
| **15** | VccR | Receiver Power Supply. | |
| **16** | VccT | Transmitter Power Supply. | |

| | | | |
|---|---|---|---|
| **17** | VeeT | Transmitter Ground (Common with Receiver Ground). | 1 |
| **18** | TD+ | Transmitter Non-Inverted Data In. AC Coupled. CML-I. | |
| **19** | TD- | Transmitter Inverted Data In. AC Coupled. CML-O. | |
| **20** | VeeT | Transmitter Ground (Common with Receiver Ground). | 1 |

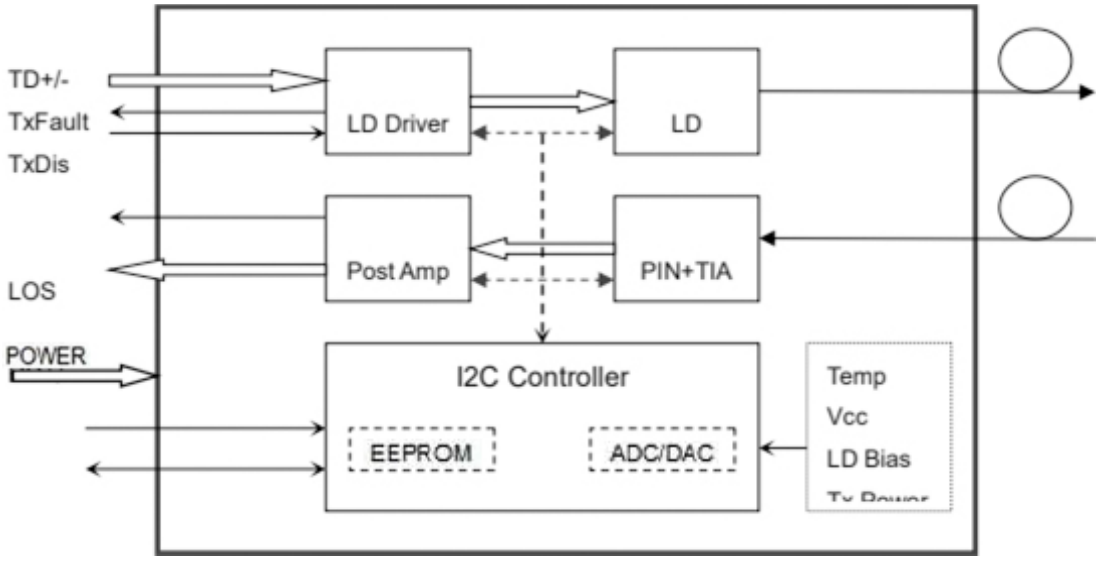
**Notes:**

1. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
2. This contact is an open collector/drain output and should be pulled up to the Host_Vcc with resistor in the range 4.7kΩ to 10kΩ. Pull-ups can be connected to one or several power supplies; however, the host board design shall ensure that no module contract has voltage exceeding module VccT/R+0.5V.
3. Tx_Disable is an input contact with a 4.7kΩ to 10kΩ pull-up resistor to VccT inside the module.
4. MOD_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull the contract up to Host_Vcc with a resistor in the range from 4.7kΩ to 10kΩ. MOD_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.
5. Internally pulled down per SFF-8431.

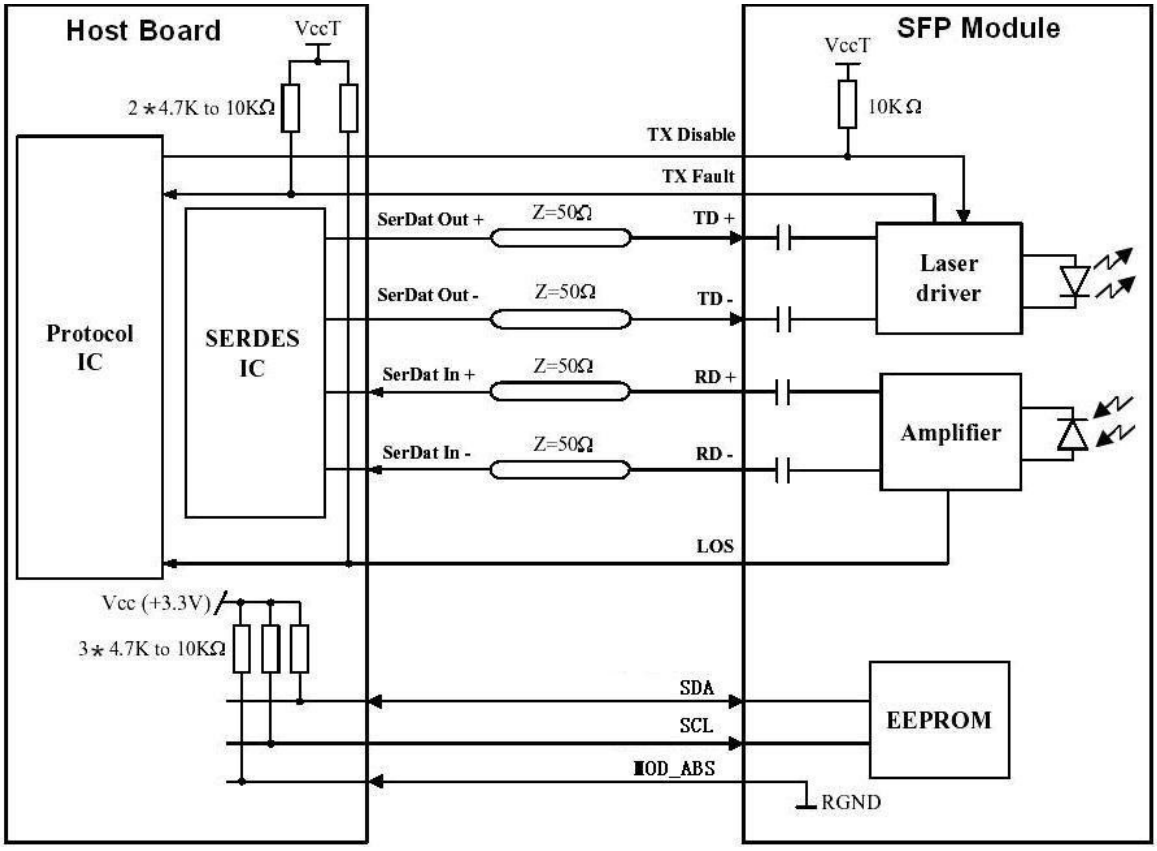



Pin-Out of Connector Block on the Host Board

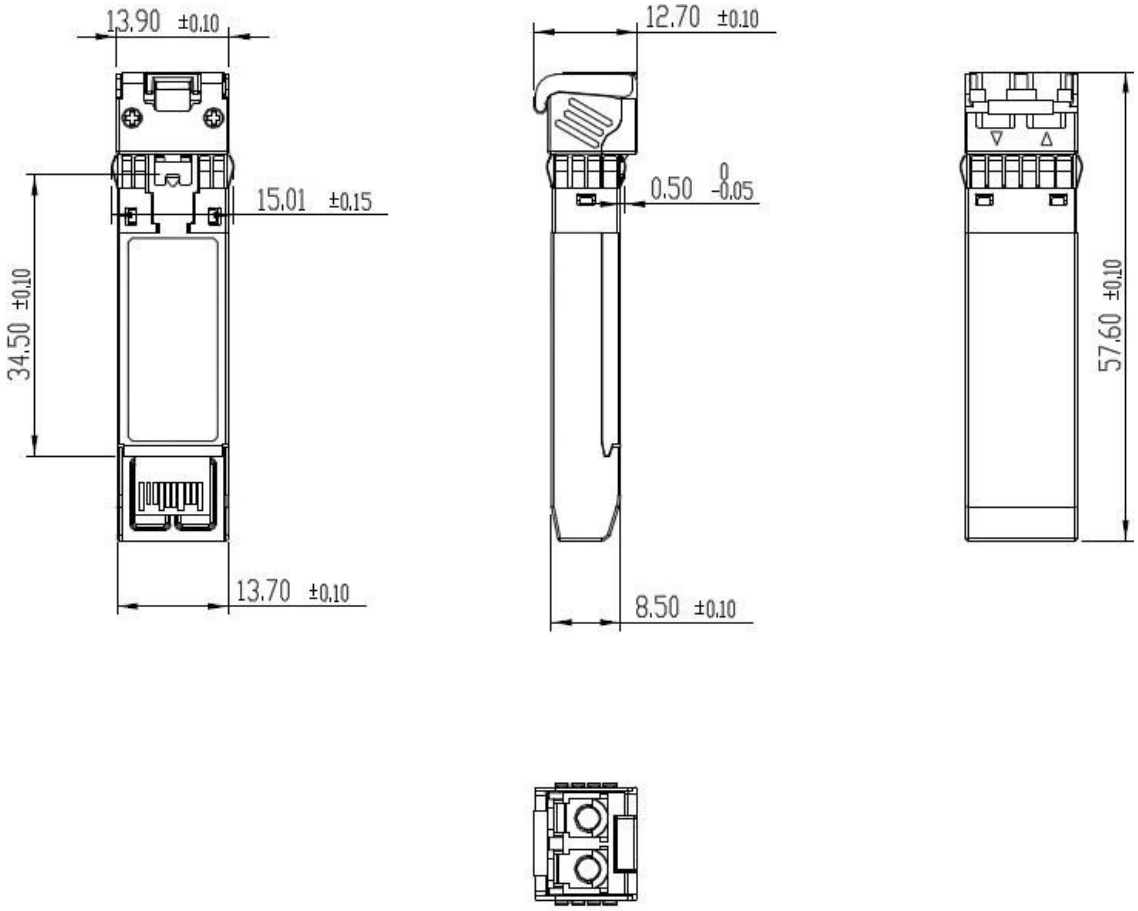
**Transceiver Functional Diagram**




**Recommended Interface Circuit Schematic**

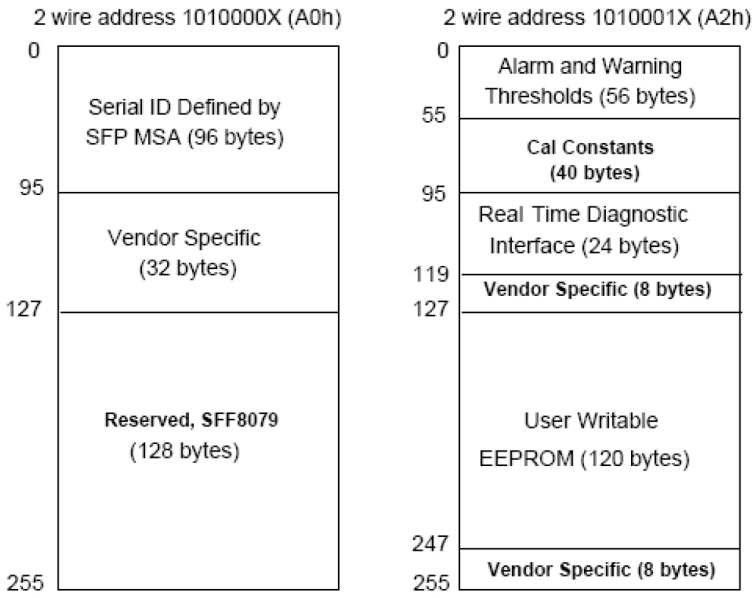


**Mechanical Specifications**




**EEPROM Information**

EEPROM memory map-specific data field description is as below:



**About AddOn Networks**

In 1999, AddOn Networks entered the market with a single product. Our founders fulfilled a severe shortage for compatible, cost-effective optical transceivers that compete at the same performance levels as leading OEM manufacturers. Adhering to the idea of redefining service and product quality not previously had in the fiber optic networking industry, AddOn invested resources in solution design, production, fulfillment, and global support.

Combining one of the most extensive and stringent testing processes in the industry, an exceptional free tech support center, and a consistent roll-out of innovative technologies, AddOn has continually set industry standards of quality and reliability throughout its history.

Reliability is the cornerstone of any optical fiber network and is ingrained in AddOn's DNA. It has played a key role in nurturing the long-term relationships developed over the years with customers. AddOn remains committed to exceeding industry standards with certifications ranging from NEBS Level 3 to ISO 9001:2015 with every new development while maintaining the signature reliability of its products.




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